

USE OF PROGESTERONE-BASED FTAI PROTOCOL FOLLOWED BY GnRH OR hCG TREATMENT ON DAY 6 POST-AI IN REPEAT BREEDER CATTLE

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ABSTRACT

Repeat breeder cattle (n=45) were synchronized using intravaginal progestational device (TRIU-B) based Co-Synch protocol. On day 6 post artificial insemination (AI), all the animals were administered (i.m.) either 10 µg GnRH analogue, (n=15), 1500 IU hCG (n=15) or normal saline (n=15). Pregnancy diagnosis was carried out on day 45 post-AI. Jugular vein blood was collected on day 6 and day 12 post-AI for serum progesterone estimations. On day 12 post-AI, serum progesterone values both overall as well as in the conceived animals were high ($p < 0.05$) in hCG group compared to control. In GnRH, hCG and control group, the respective conception rate was 40%, 46.7% and 33.3%. In brief, administration of hCG on day 6 post AI improves subsequent luteal profile with tendency for better conception rate in repeat breeder cattle.

Keywords: Co-synch, Conception rate, GnRH, hCG, Progesterone,

To alleviate the problem of repeat breeder in dairy cattle, many estrous synchronization protocols were used but the precision of estrus and subsequent fertility rate was not optimal (Sathyamoorthy and Kathirchelvam, 2010). Therefore, the present trial was designed to study the impact of GnRH or hCG administration on day 6 post artificial insemination (AI) on conception rate in repeat breeder cattles.

The present study was conducted on apparently healthy repeat breeder cattle that were randomly assigned to three groups containing 15 animals each. All the animals of each group were synchronized using an intravaginal progestational device (TRIU-B) based Co-Synch protocol (day 0, 10 µg buserelin acetate i.m. along with intravaginal TRIU-B containing 958 mg progesterone; day 6, 500 µg cloprostenol sodium i.m.; day 7, removal of TRIU-B; day 9, Fixed Time AI along with 10 µg buserelin acetate i.m.; day 10, repeat AI). On day 6 post-AI, all the animals were administered (i.m.) either 10 µg buserelin acetate,

1500 IU hCG or normal saline. Jugular vein blood samples were collected on day 6 and day 12 post-AI. The samples were centrifuged at 3,000 rpm for 15 min, serum was separated and stored at -20°C till progesterone analysis through Radioimmunoassay (National Institute of Animal Nutrition and Physiology, Bangalore). Pregnancy diagnosis was carried out by per rectal examination on day 45 post-AI. Statistical analysis was carried out using Graph Pad Prism software version 5.

Serum progesterone was similar ($p > 0.05$) between groups on day 6 post-AI (Table 1), which may be due to similar synchronization protocol used for all the cattle. Compared to control animals, an increase in serum progesterone in both GnRH and hCG group was observed on day 12 post-AI (Table 1), however this increase was significant ($p < 0.05$) only in hCG treated animals. The longer half life (30h) of hCG and slower turnover of luteinizing hormone (LH) receptors activated by hCG on the surface of granulosa cells could be responsible for greater gonadotropic stimulation of follicles following treatment with hCG on day 6 post-AI (Chenault *et al.*, 1990).

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Table 1: Serum progesterone (P_4 , ng/ml) and conception rate following GnRH or hCG administration on day 6 post-AI

Day / Group	GnRH	hCG	Control
Total animals	15	15	15
P_4 d6	3.24±0.58	3.89±0.60	3.67±0.64
P_4 d12	6.15±1.59 ^{ab}	7.52±0.66 ^a	5.54±0.69 ^b
P_4 d12, Pregnant	7.50±0.78 ^{ab} (n=6)	9.24±0.23 ^a (n=7)	6.14±0.81 ^b (n=5)
P_4 d12, Non pregnant	5.25±1.25 (n=9)	6.00±0.95 (n=8)	5.24±0.96 (n=10)
Conception rate (Relative risk)	40.0% (1.20)	46.7% (1.40)	33.3% (1.00)

$p < 0.05$, Mean value having different superscript within the same row differ significantly

On day 12 post-AI, serum progesterone was uniformly high in pregnant cattle compared to their non-pregnant counterparts in all the groups (Table 1). In addition, between groups on day 12 post-AI, serum progesterone was high ($p < 0.05$) in pregnant animals of hCG group compared to their counterparts in control group (Table 1). The present finding of an increase in progesterone on day 12 post-AI in hCG treated animals can be attributed to higher steroidogenicity of corpus luteum (CL) induced in hCG group (Fonsec *et al.*, 2001).

The conception rate in GnRH, hCG and control group cattle was 40.0%, 46.7% and 33.3%, respectively (Table 1). Although the differences in conception rate between treatment groups was statistically non-significant ($p > 0.05$), the conception rate was higher in hCG-treated animals followed by GnRH or control animals (Table 1). The accessory CL formation following induction of ovulation or luteinisation of first wave dominant follicle on day 5 to 7 of estrous cycle (Santos *et al.*, 2001) and consequent increase in circulating progesterone is expected to minimize the luteolytic cascade by endometrial cells during the period of maternal recognition of pregnancy, which favours pregnancy maintenance (Mann *et al.*, 2001).

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